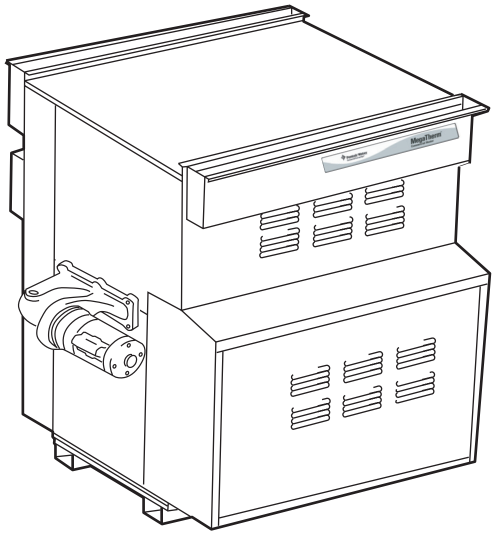
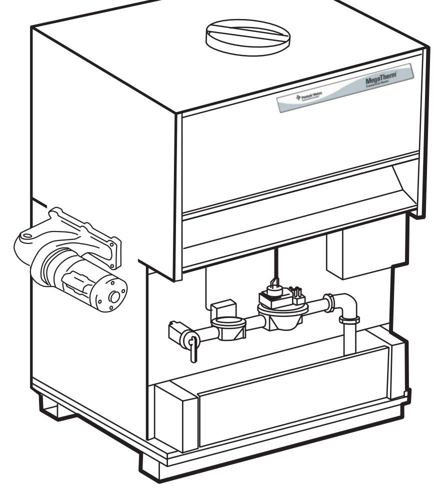
Installation and Operation Instructions for

MegaTherm™

Pool Heating Boiler





Model MT

Sizes 500 - 1825

IMPORTANT: Store these instructions in the pocket provided on the heater

FOR YOUR SAFETY: This product must be installed and serviced by a professional service technician, qualified in hot water boiler installation and maintenance. Improper installation and/or operation could create carbon monoxide gas in flue gases which could cause serious injury, property damage, or death. Improper installation and/or operation will void the warranty.

⚠WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a nearby phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

Installation and service must be performed by a qualified installer, service agency, or gas supplier.

⚠AVERTISSEMENT

Assurez-vous de bien suivres les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion ou pour éviter tout dommage matériel, toute blessure ou la mort.

Ne pas entreposer ni utiliser d'essence ni d'autres vapeurs ou liquides inflammables dans le voisinage de cet appareil ou de tout autre appareil.

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:

- **Ne pas tenter d'allumer d'appareils.**
- **Ne touchez à aucun interrupteur. Ne pas vous servir des téléphones dansle bâtiment où vous vous trouvez.**
- **Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suivez les instructions du fournisseur.**
- **Si vous ne pouvez rejoindre le fournisseur de gaz, appelez le sservice des incendies.**

L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.

IMPORTANT SAFETY INSTRUCTIONS
READ AND FOLLOW ALL INSTRUCTIONS
SAVE THESE INSTRUCTIONS

P/N 472643 Rev A - 05/22/06

Pentair Water
Commercial Pool and Spa™

TABLE OF CONTENTS

Pentair Technical Support

Sanford, North Carolina (8 A.M. to 5 P.M.)
Phone: (800) 831-7133
Fax: (919) 566-8920

Moorpark, California (8 A.M. to 5 P.M.)
Phone: (800) 831-7133
Fax: (800) 284-4151

Web sites: visit www.pentairpool.com and www.staritepool.com

SECTION 1. General Information

1.1 Introduction

This manual provides information for the installation and operation of MegaTherm model MT pool heating boilers. It is strongly recommended that all application and installation procedures be reviewed completely before proceeding with the installation. Consult Pentair Commercial Pool and Spa, or your local sales representative, with any problems or questions regarding this equipment. Experience has shown that most problems are caused by improper installation, not system design.

Some accessory items are shipped in separate packages. Verify receipt of all packages listed on the packing slip. Inspect everything for possible damage upon delivery, and inform the carrier of any shortages or impairments. Any such claims should be filed with the carrier. The carrier, not the shipper, is responsible for shortages and damage to the shipment whether visible or concealed.

> **⚠WARNING**
> The MegaTherm model MT commercial pool heating boiler must be used on potable water only. For heating pools containing salt water, a specially equipped heater must be used; consult your distributor or factory representative. The pool heating boiler must be installed in accordance with the procedures

The warranty does not apply to heaters not installed or operated in accordance with these procedures. Consult local building and safety codes before proceeding with work. The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the latest edition of the National Fuel Gas Code; ANSI Z223.1, National Electrical Code ANSI/NFPA 70. In Canada, the installation must conform with the latest edition of CSA-B149.1 requirements.

When required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers safety codes for controls and safety devices for automatically fired heaters No. CSD-1, and in Canada CGA 3.3. Any modification of the heater, its gas controls, gas orifices, wiring or drafter diverter may void the warranty. If field conditions require such modifications, consult factory.

1.2 Heater Identification

Consult rating plate on the heating boiler. Shown below is a breakdown of the model nomenclature. Commercial pool heating boilers are available in two configurations: an indoor version and an outdoor version. Outdoor models are not available in Canada.

1.3 Primary/Secondary Pump and Piping

All models are supplied with integrally mounted pumps. The 1825 models use a 3/4 HP pump and all other models are supplied with 1/2 HP pumps. These pumps are sized for the pressure drop through the heat exchanger and through the bypass piping as shown in Figure 10.

Any deviations from the arrangement shown may increase the head on the pump, reduce flow and hinder performance (see Section 2.7). For spas see Section 3.9.

This piping arrangement and the integral pump allow hot water to be recirculated to the heater inlet, thus raising the inlet temperature and greatly reducing condensation.

1.4 Certifications

All models are design-certified by CSA for natural or propane gas and conform to ASME Code requirement for 160 PSI water pressure.

1.5 Engineering Assistance

Consult the factory or distributor regarding any questions or problems which arise in the specification, installation or operation of this equipment. An experienced engineering staff is ready to assist in assuring the proper performance and application of this products.

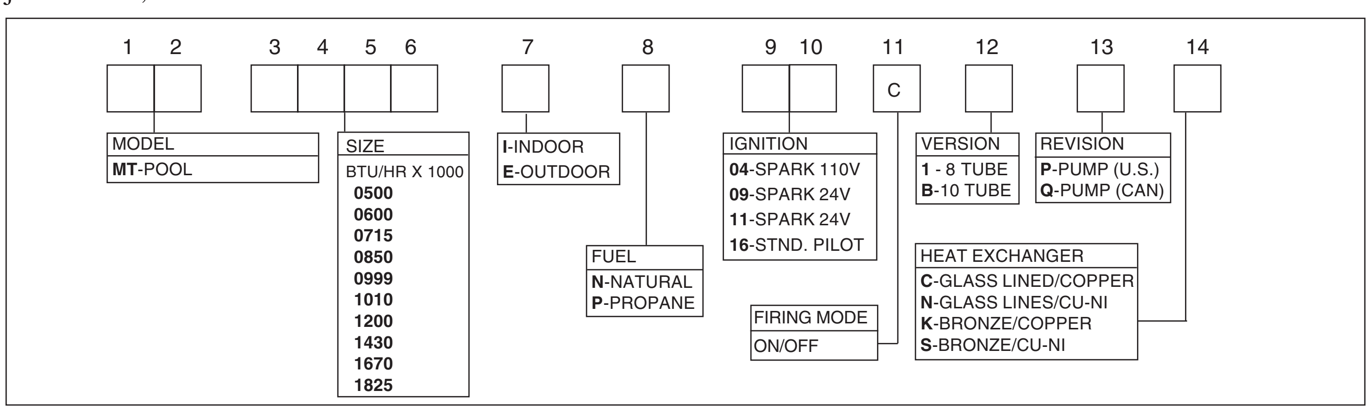


Figure 1. Heater Identification (model nomenclature).

SECTION 2.
Installation

2.1 Boiler Placement

The pool heating boiler must be placed to provide specific clearances on all sides for maintenance and inspections. There must also be minimum distances maintained from combustible surfaces. These clearances also apply to noncombustible materials because the pool heating boiler requires air circulation for proper operation.

The pool heating boiler should be mounted on a level surface. An integral base for an installation on combustible flooring is provided as standard equipment on <u>outdoor</u> models. For <u>indoor</u> models, special base rails part number 10539000 must be used for combustible flooring.

<u>Do not install a pool heating boiler on carpeting.</u>

Under the national Fuel Gas Code, ANSI Z223.1, it is permissible to place the boiler on floors other than noncombustible when the installation complies with the American Insurance Code. Figures 2, 3, 4 and 5 show common installation on combustible flooring.

2.2 Installation of Indoor Boilers

Locate the pool heating boiler to provide adequate clearance for inspection and service on all sides. See Table 1. For alcove installation, see Figure 6.

Install indoor heaters on a waterproof floor with an adequate floor drain and a 6" (152mm) minimum curb on all four sides to protect the building if heater repairs are required. **The manufacturer will not be held liable for any water damage in connection with this boiler.**

2.2.1 Combustion Air Supply

The heater location must provide sufficient air supply for proper combustion and ventilation of the surrounding area as outlined in the latest edition of ANSI standard Z223.1, and any local codes that may be applicable. Inadequate combustion air supply may result in incomplete combustion, sooting of the heat exchanger, and unsafe operation of the boiler.

a. Conventional Ventilation

In the United States, the most common of these requirements specify that boiler rooms should be provided with two permanent air supply openings communicating directly through the wall to outside air one within 12 inches (305mm) of the ceiling, and the other within 12 inches (305mm) of the floor. Each opening should have a minimum free area of one square inch (6.5 sq. cm) per 4,000 BTU/hr input of the total input rating of all appliances in the enclosed area. See Table 2 for recommended air supply for each model. An improperly ventilated equipment room can get excessively hot and cause accelerated deterioration of controls and electrical components.

In Canada, Table 2 does not apply. Consult local building codes or, in the absence of such requirements, follow CSA-B149.1 standard.

Clearance from	Indoor in.	Indoor *mm*	Outdoor in.	Outdoor *mm*
Top	**30**	*762*	unobstructed	
Water Conn. side	**12***	*305*	**24**	*610*
Pump side	**6***	*152*	**24**	*610*
Front	Alcove*		unobstructed	
Rear	**8**	*203*	**24**	*610*
Vent pipe**	**6**	*152*	- - -	
Hot water pipes	per code		per code	

* Water connection and pump side clearances of 24" (610mm) and front clearances of 48" (1219mm) will allow easier service access.
** Using type B vent (refer to Manufacturer's Instructions).

Table 1. Minimum boiler clearances from adjacent surfaces.

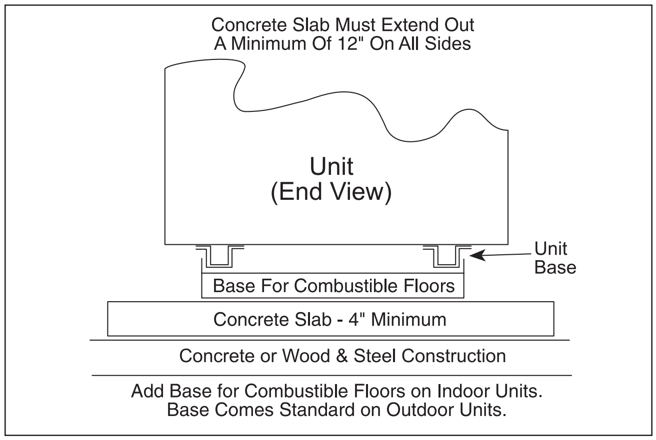


Figure 2. Typical Boiler Installation on Concrete Slab.

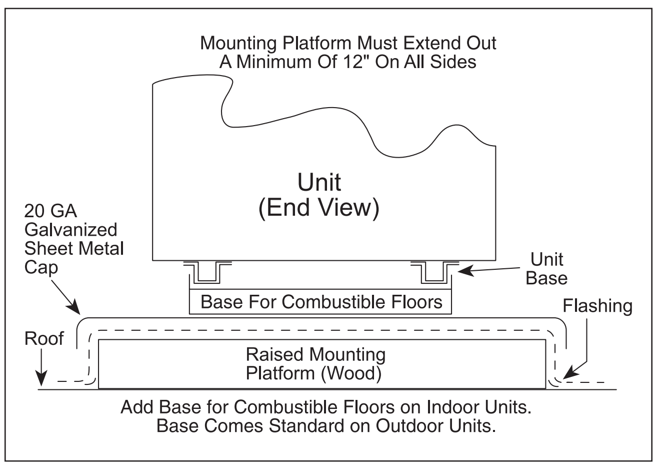


Figure 3. Typical Boiler Installation on Roof Using Raised Platform (wood).

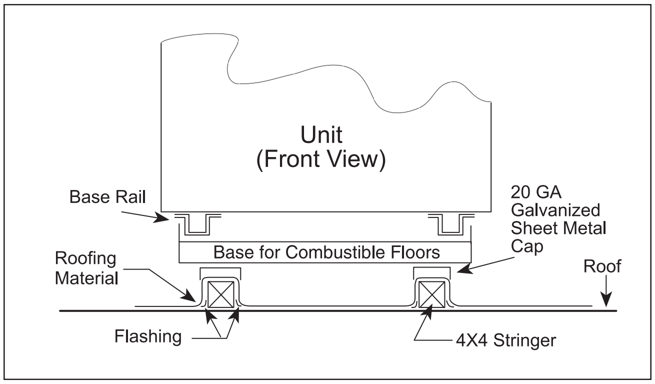


Figure 4. Typical Boiler Installation on Roof Using 4x4 Stringer.

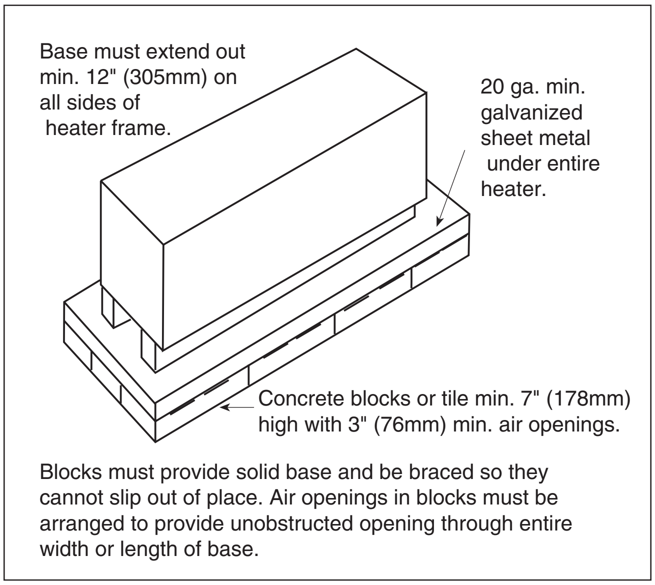


Figure 5. Installation on Concrete Blocks or Tile.

b. Forced-Air Ventilation

In the United States: any equipment which exhausts air from the boiler room can deplete the combustion air supply or reverse the natural draft action of the venting system. This could cause flue products to accumulate in the boiler room. Additional air must be supplied to compensate for such exhaust. The information in Table 2 is not applicable in installations where exhaust fans or blowers of any type are used. Such installations must be designed by qualified engineers.

In Canada: follow Canadian standard, CSA-B149.1 or local codes.

If a blower or fan is used to supply air to the boiler room, the installer should make sure it does not create drafts which could cause nuisance shutdowns of the pilot. If a blower is necessary to provide adequate combustion air to the boiler, a suitable switch or interlock must be wired into the heater control circuit to prevent the heater from firing unless the blower is operating.

The boiler must be completely isolated and protected from any source of corrosive chemical fumes such as trichlorethylene, perchloroethylene, chlorine, etc.

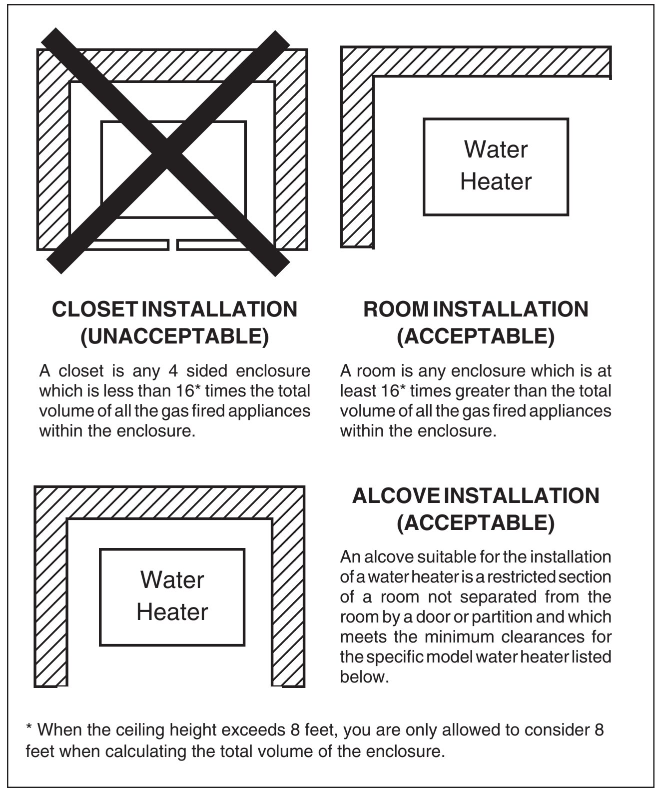


Figure 6. Alcove Installation.

2.2.2 Venting

The MegaTherm boiler has a built-in draft diverter for natural draft operation and must not be connected to any portion of a mechanical draft system under positive pressure. The flue outlet must be connected to a clear, unobstructed vent of adequate capacity ending above the highest point of the building with an approved vent cap. The venting system should be installed according to the latest edition of ANSI Z223.1 and/or, in Canada, CSA-B149.1 and any local codes having jurisdiction.

Do not weld or fasten the vent pipe to the boiler drafthood. The weight of the stack must not rest on the boiler. The drafthood and boiler top must be easily removable for normal boiler service and inspection.

IMPORTANT NOTE: Do not use sheet metal screws at the snap lock joints of Type B gas vents.

Avoid using long horizontal runs of the vent pipe, and too many 90° elbows, reductions or restrictions. Horizontal runs should have at least a 1/4" (6mm) rise per foot in the direction of flow. A vent connector should be supported for the design and weight of the material used to maintain clearances and prevent physical damage and separation of joints.

Avoid terminating boiler vents near air conditioning or air supply fans. The fans can pick up exhausted flue products from the boiler and return them inside the building creating a possible health hazard. A minimum of 4 feet (1.2m), in Canada 6 feet (1.8m), horizontal distance must be maintained from electrical meters, gas meters, and relief equipment.

Always use double-wall or insulated vent pipe (Type B or equivalent). In cold weather, uninsulated outside vents can chill the rising flue products blocking the natural draft action of the venting systems. This can create a health hazard by spilling flue products in the boiler room.

Avoid oversized vent piping or extremely long runs of pipe which may cause excessive cooling and condensation. Rule of Thumb: the total length of the vent, including the connector and any offset, should not exceed 15 feet (4.6m) for every inch (25mm) of vent diameter. Longer total lengths shown in venting tables are based on maximum capacity, not condensation factors.

When the installation of a draft fan is necessary in connecting a venting system to a MegaTherm boiler, the installation should be engineered by competent personnel following good engineering practices. The draft fan supplier should be consulted for correct size. The installation should be in accordance with the latest edition of ANSI Z223.1 and/or, in Canada, CSA-B149.1 and any local codes having jurisdiction. When a draft fan is installed, a suitable draft switch must be wired into the boiler control circuit at terminal designated "Field Interlock" to prevent firing of the boiler unless a positive draft has been established.

2.2.3 Common Venting System Test Procedure

At the time of the removal of an existing heater, the following steps shall be followed with each appliance remaining connected to the common venting system. During the testing of each unit, the other appliances remaining connected to the common venting system should not be operated.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch. Determine that there is no blockage or restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
3. Insofar as it is practical, close all building doors and windows. Also close all doors between the space in which the appliances remaining connected to the common venting system are located and the other spaces of the building. Turn on any clothes dryer and any appliance not connected to the common venting system. Turn on any exhaust fans, including range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close all fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions for the unit. Adjust the thermostat so the appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the *National Fuel Gas Code, ANSI Z223.1 and/or CSA-B149.1 , Installation Codes*. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix G in the *National Fuel Gas Code, ANSI Z223.1 and/or CSA-B149.1 Installation Codes.*

2.2.3 Instructions Relatives au Test des Systèmes à Évent Commun

Au moment du restrait d'une chaudière existante, les mesures suivantes doivent être prises pour chaque appareil toujours reccordé au système d'évacuation ne fonctionnet pas:

1. Sceller toutes les ouvertures non utilisées du systèmes d'évacuation.
2. Inspecter de façon visuelle le système d'évacuation pour déterminer la grosseur et l'inclinaison horizontale qui conviennent et s'assurer que le système est exempt d'obstruction, d'étranglement, de fuite, de corrosion et autres défaillances qui pourraient présenter des risques.
3. Dans la mesure du possible, fermer toutes les portes et les fenêtres du bâtiment et toutes les portes entre l'espace où les appareils toujours raccordés au système d'évacuation sont installés et les autres espaces du bâtiment. Mettre en marche les sécheuses, tous les appareils non raccordés au système d'évacuation common et tous les ventilateurs d'extraction comme les hottes de cuisinière et les ventilateurs des salles de bain. S'assurer que ces ventilateurs fonctionnent à la vitesse maximale. Ne pas faire fonctionner les ventilateurs d'été. Fermer les registres des cheminées.
4. Mettre l'appareil inspecté en marche. Suivre les instructions d'allumage. Régler le thermostat de façon que l'appareil fonctionne de façon continue.
5. Faire fonctionner le brûleur principal pendant 5 min ensuite, déterminer si le coupe-tirage déborde à louverture de décharge. Utiliser la

flamme d'une chandelle ou la fumée d'une cigarette, d'une cigare ou d'une pipe.

6. Une fois qu'il a été déterminé, selon la méthode indiquée ci-dessus, que chaque appareil raccordé au systéme d'évacuation est mis à l'air libre de façon adéquate. Remettre les portes et les fenêtres, les ventilateurs, les registres de cheminées et les appareils au gaz à leur position originale.
7. Tout mauvais fonctionnement du systéme d'évacuation commun devrait être corrigé de façon que l'installation soit conforme au *National Fuel Gas Code, ANSI.Z223.1* et (ou) aux codes *d'installation CSA-B149.1.* Si la grosseur d'une section du système d'évacuation doit être modifiée, le système devrait être modifié pour respecter les valeurs minimales des tableaux pertinents de l'appendice G du *National Fuel Gas Code, ANSI Z2231.1* et (ou) des codes *d'installation CSA-B149.1.*

2.3 Installation of Outdoor Boilers

1. Locate the boiler to provide the clearances as listed in Table 1, "Minimum Boiler Clearances."
2. Do not place the boiler in an enclosure or wall recess. Avoid locations where wind deflection off structures might cause downdraft. When such wind conditions are possible, place the heater at least 3 feet (0.9m) from the structures.
3. Never install the boiler under any kind of roof overhang. Do not place the boiler below or adjacent to any doors, windows, louvers, grills, etc., which connect in any way with an inhabited area of a building. This includes other structures such as garages or utility rooms (see Figure 7).
4. Although these models are CSA designed certified for outdoor installations, such installations are not recommended in areas where the danger of freezing exists unless proper precautions are taken for freeze protection.

   Outdoor installations are not recommended in areas where the danger of snow blockage exists.

⚠WARNING

Liquefied petroleum gas is heavier than air. Therefore, the pool heating boiler should not be installed in pits or other locations where gas could accumulate.

The boiler should be located a safe distance from Propane gas storage and filling equipment. Consult local codes and fire protection authorities for advice on specific installation restrictions.

Boiler Size	Each Opening* square inches	*square cm*
500	125	*806.5*
600	150	*967.8*
715	179	*1154.9*
850	213	*1374.3*
1010	253	*1632.4*
1200	300	*1935.6*
1430	358	*2309.8*
1670	418	*2696.9*
1825	457	*2948.6*

* Net Free Area.

Check with louver manufacturers for net free area of louvers. Correct for screen resistance to the net free area if a screen is installed. Check all local codes applicable to combustion air.

Area indicated is for one of two openings: one at floor level and one at the ceiling, so the total net free area could be double the figures indicated. For special conditions refer to the latest editon of ANSI Z223.1.

Consult factory if openings do not communicate directly through the walls with the outdoors.

Table 2. Minimum Recommended Air Supply to Boiler.

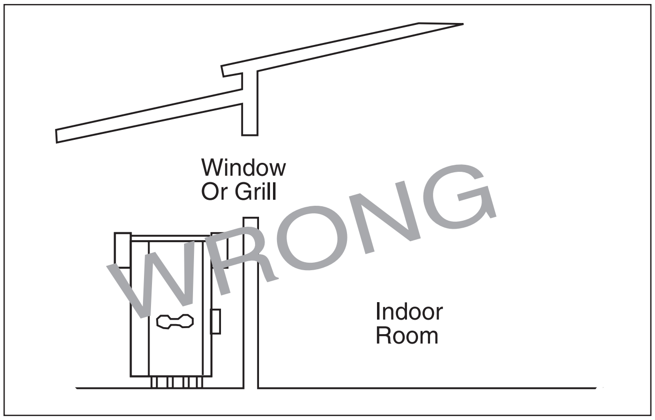


Figure 7. Incorrect Outdoor Installation.

2.4 Gas Supply and Piping

Review the following instructions before proceeding with the installation.

1. Verify that the boiler is fitted for the proper type of gas by checking the rating plate. MegaTherm boilers are normally equipped to operate below a 2000 foot (609.6m) altitude. Boilers equipped to operate at higher altitudes have appropriate stickers or tags attached, also printed information on rating plate.
2. Use the figures in Table 3 to provide adequate gas piping from the gas meter to the boiler.
3. A sediment trap (drip leg) must be provided ahead of the gas controls (see Figure 8). A manual gas shutoff valve must also be provided for service convenience and safety. Check the local codes.

Boiler Size	**Distance from Gas Meter or Last Stage Regulator**		
	0-100' *0-30.5m*	**100-200'** *30.5-61m*	**200-300'** *61-91.4m*
500	1½"	2"	2"
600	1½"	2"	2½"
715	2"	2"	2½"
850	2"	2½"	2½"
1010	2"	2½"	3"
1200	2½"	3"	3"
1430	2½"	3"	3"
1670	2½"	3"	3
1825	2½"	3"	3½"

NOTE: These figures are for Natural Gas (.65 Sp. Gr.), and are based on 1/2" water column pressure drop. Check supply pressure with a manometer, and local code requirements for variations. For **Propane Gas**, reduce pipe diamter one size. An average number of tees and elbows have been taken into account.

Table 3. Gas Piping Sizes.

4. The boiler and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.5kPa). The boiler must be isolated from the gas supply piping system by closing its individual manual gas shutoff valve during any pressure testing of the piping system at test pressures equal to or less than 1/2 psig (3.5kPa).
5. Provide gas supply pressure to the heater as follows:

	Natural Gas		Propane Gas	
	In. W.C.	*kPa*	In. W.C.	*kPa*
Max.	10	*2.5*	14	*3.4*
Min.	6.5	*1.6*	11	*2.7*

NOTE: the heater and all other gas appliances sharing the boiler gas supply line must be firing at maximum capacity to properly measure the inlet supply pressure. Low gas pressure could be an indication of an undersized gas meter and /or obstructed gas supply line.

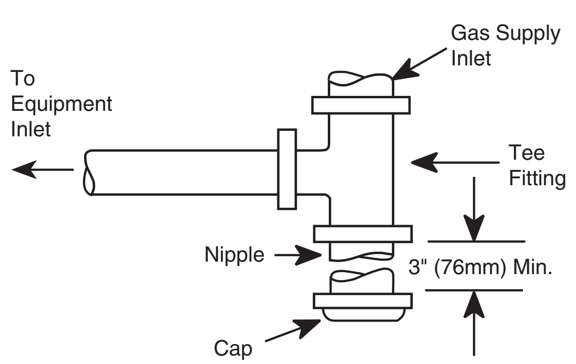


Figure 8. Sediment Trap Installation.

6. The correct burner manifold gas pressure is stamped on the rating plate. The regulator is preset at the factory and normally requires no further adjustment.

The gas manifold and control assembly is factory tested and conforms to the safe lighting and other performance criteria specified in the latest editions of ANSI Z21.13.CSA4.9 Low Pressure Boiler Standard.

Before operating the boiler, the complete gas supply system and all connections must be tested for leaks using a soap solution. **Do not use raw flame**.

Caution

Since some leak test solutions (including soap and water) may cause corrosion or stress cracking, the piping must be rinsed with water after testing, unless it has been determined that the leak test solution is noncorrosive.

2.5 Electrical Wiring

WARNING

The boiler must be electrically grounded in accordance with the most recent edition of the National Electrical Code, ANSI/NFPA 70. In Canada, all electrical wiring to the boiler should be in accordance with the latest edition of CSA C22.1 Canadian Electrical Code, Part 1. Do not rely on the gas or water piping to ground the metal parts of the boiler. Plastic pipe or dielectric unions often isolate the boiler electrically. Service and maintenance personnel who work on or around the heater may be standing on wet floors and could be electrocuted by an ungrounded boiler.

Wiring diagrams are included in the information packet provided with each unit.

1. All Model MT pool heating boilers need 115V 60Hz supply voltage unless specifically ordered otherwise.
2. The 1825 models are supplied with 3/4 HP pump motors. All other models are supplied with 1/2 HP pump motors. Consult the National Electrical Code or the Canadian Electrical Code regarding branch circuit requirements for equipment with these motors.
3. The boilers should be wired exactly as shown in the wiring diagram.

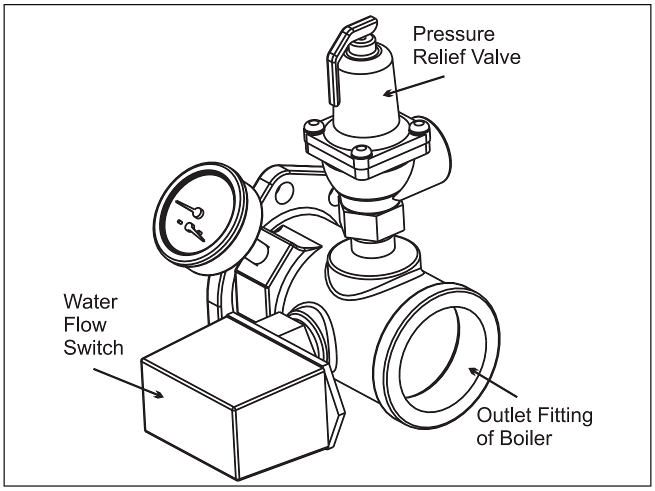


Figure 9. Pressure Relief Valve Location.

IMPORTANT NOTE: The pool filter pump and boiler must be electrically interlocked so the boiler cannot come on unless the pump is running and there is full flow in the filter piping where the boiler is connected. If the pool filter pump operation is intermittent the boiler must be shut off prior to pump shutdown. See paragraph heading Auxiliary Time Clock Wiring below. If the backwash operation is manual the boiler must be shut off manually during backwashing.

Auxiliary Time Clock Wiring:

If a time clock is used to control the filter pump operation, a separate switch or relay must be used to shut off the boiler at least 15 minutes before the filter pump is shut off. Wire the switch or relay (often called the Fireman Switch) to the terminals shown in the wiring diagram as “Field Interlock.”

4. All field installed electrical safety devices and all field installed controllers (valve end switches, draft switches, relays, timers) can be connected to the boiler control to the terminals shown in the wiring diagram designated “Field Interlock.”
5. Field location of the temperature sensor is described in Section 2.8.

Where the boiler is installed with a draft fan refer to the fan manufacturer's wiring diagram. The draft switch should be wired across the field interlock terminals in the boiler control panel.

2.6 General Piping Instructions

In addition to the bypass valve “B” and outlet valve “A” shown in Figure 10, an inlet valve “C” should be provided so that the heater can be readily isolated for service. All valves should be butterfly or ball style, not gate valves. For spas application see Section 3.9.

Since heater outlet temperatures can reach 150°F (66°C) in some cases, copper or CPVC are recommended materials for heater connection piping. PVC material may be used for the inlet valve and the piping upstream of it.

When pipe, fittings, grids or any other element of the filter system are made of plastic materials, they may be damaged by the momentary "back siphoning" of hot water from the heater when the filter pump stops running.

The pressure relief valve installed in the tapped opening provided in the outlet header (see Figure 9), must be piped, but not connected, to a drain or floor sink. The drain pipe must be the same size as the valve outlet and must pitch downward from the valve. Where no special setting of the relief valve is ordered, the factory will furnish a 75 psi setting.

The pressure relief valve lever must be tripped at least once a year to insure that waterways are clean. When manually operating lever, water will discharge through the drain line. Precautions must be taken to avoid contact with hot water and water damage.

2.7 Boiler By-Pass Piping

All MT series boilers, 500-1825 models, must be installed with bypass piping. Please use Figure 10 as your guide to plumb the bypass. For spas see Section 3.9.

The diverter valve in the main line, shown in dashed line in Figure 11, is optional and may be needed only if the distance to the heater is over 15'. Call the Service Department at 800-900-9276, extension 5406 for assistance.

All models are supplied with integral pumps, These pumps are sized for the pressure drop through the heat exchanger, 30 feet of piping and through the bypass piping as shown in Figure 10.

Any deviations from the arrangement shown may reduce flow, hinder performance, and will void the warranty.

2½ inch NPT piping is shown, however, models 500I-1430I and models 500E-1010E may be installed using 2 inch NPT piping.

All models must be installed in the primary-secondary arrangement shown. The boiler loop piping must tee into the filter loop piping with the inlet and outlet connection spaced a maximum of 18" (450mm) apart (see Figure 10).

To insure that pool inlet water does not exceed 104°F, the filter pump loop must circulate at the minimum flow rates shown in Table 4.

The outlet valve “A” and the bypass valve “B” must have a provision for locking the handles in place (or removing them) after the temperature rise and inlet temperature adjustments have been made.

Boiler Model	Minimum Filter Pump Flow Rate
500-850	90 GPM
1010-1200	110 GPM
1430	140 GPM
1670-1825	180 GPM

Table 4. Minimum Flow to Supply Heater Loop.

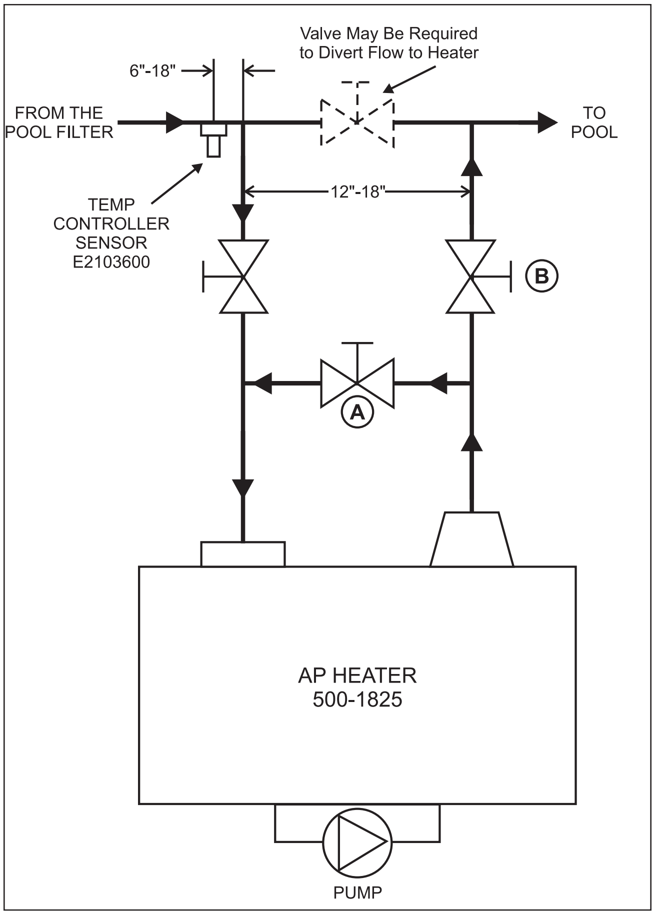


Figure 10. Heater Piping Arrangement.

2.8 Temperature Sensor Placement and Installation

A temperature sensor with 15 feet (5m) of cable and an immersion well assembly are supplied with the boiler. These must be installed in the field. Refer to Figures 10 through 11.

1. The immersion well body is provided with a 1/2" NPT. Mount the immersion well on the underside of the filter circulation piping, just upstream of the boiler inlet tee as close to the boiler as possible (see Figure 10). **DO NOT INSTALL in boiler loop piping or downstream of the boiler inlet tee.**
2. Thread the spring and retainer onto the sensor cable and secure sensor into the immersion well.
3. Route cable to heater control panel in a location where it will not be subject to damage. Secure with nylon cable ties.

2.9 Automatic Chlorinators

A concentration of chlorine in the heater can be very destructive, therefore the following rules about the installation and operation of such devices must be followed:

1. The chlorinator should be installed so it introduces the gas or solution downstream from the boiler.
2. The chlorinator should be wired so it cannot operate unless the filter pump is running.
3. The chlorinator should be provided with an anti-siphon device so that the draining of the piping after the pump shuts off will not siphon chlorine solution into the boiler.
4. When the operation of a chlorinator is such that it must be installed in the pump suction, or some other place where the chlorine solution flows through the heater, corrosion of the heater can occur. Excessive concentrations of chlorine caused by improper adjustment or failure of the chlorination equipment cause this corrosion. The resulting damage to the heat exchanger is not covered by heater warranty.

SECTION 3. Operation

3.1 Controls - General (see Figures 12 and 13)

1. Electronic Ignition Controls:
   a. Intermittent Ignition:

      Pilots are automatically lit when the operating control calls for heat (Systems #4 and #9). The unit performs its own safety check and opens the main valves only after the pilot is proven to be lit. Whenever the pilot flame is interrupted, the main gas valve closes within 0.8 seconds.

   b. Electronically Supervised Standing Pilot System (System #16):

      When pilot flame fails, the ignition control module responds in less than 0.8 seconds and provides 100% safety shutdown.
2. Operating Controls:
   An electronic temperature control is provided on model MT boilers to control the pool water temperature. The temperature sensor (thermistor) is located in the filter circulation piping (see Section 2.8).
3. Boiler Power (On/Off/Auto) Switch:
   This provides for constant or automatic pump operation.
4. High Limit Controls:
   The manual reset high limit switch is provided as standard equipment on all boilers. The temperature sensing bulb of the switch is always located in the heater outlet. Burners will automatically shut down whenever overheating of water occurs.
5. Flow Switch:
   Standard on all model MT pool heating boilers. The switch is mounted in a tee fitting on the outlet header. This is a paddle type switch which is deflected by the water flow in the fitting. Any condition which interrupts or decreases the flow through the secondary loop will shut down the burners.
6. Low Water Cut Off (optional):
   The low water cut off automatically shuts off boiler whenever water level in the heat exchanger drops below probe level. It is located in the inlet header.

3.2 Initial Start-Up

⚠WARNING

Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the heater. the possible damage to a flooded appliance can be extensive and present numerous safety hazards. Any appliance that has been under water must be replaced.

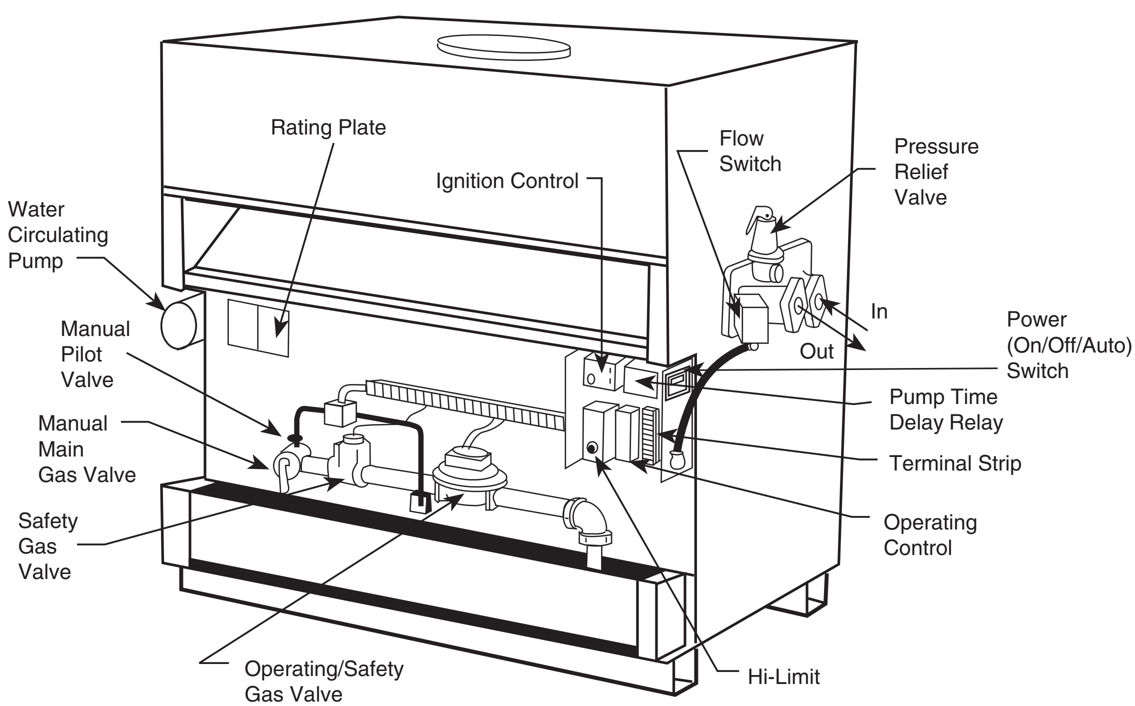


Figure 13. Controls Location.

On a newly constructed pool, be sure to run the filter pump long enough for a complete “turn-over” of the pool water before starting heater so that dirt and residue from construction will have been removed. The filter may clog rapidly during this period, causing severe cycling of the heater.

1. Before placing the heater in operation, be certain that the heater is filled with water and that all air is purged from the system. Open all the valves in the secondary piping.
2. With the filter pump running, run the heater pump in manual “CONSTANT PUMP” for minimum of 10 minutes and listen for the flow switch to make as the pump is started. Loosen the pipe plug on the top of the pump scroll casting to bleed off any air. NOTE: If the system will be operated in a manner that causes air to be drawn into the heater and the secondary piping, an automatic float type air vent should be permanently installed on top of the pump scroll.
3. To check the heater firing, proceed as follows:
   a. Turn off the power switch.
   b. Turn off all manual gas valves and wait five minutes (Figure 13).
   c. Set operating control to the lowest setting.
   d. After placing the manual pilot gas valve in the open position and resetting all safety devices (high limit, low water cutoff, etc.), the pilot(s) can be lit following the procedure on the heater rating plate.
   e. For standing pilot system, press on pilot relay knob (see Figure 15), light pilot and keep relay knob depressed for one minute then release. Once the pilot is lit, turn power switch to “AUTO PUMP.”

f. Wait 5 minutes and turn up operating control until heater fires (for intermittent ignition system, the pilot will be ignited automatically). The main burners should ignite smoothly. Turn the operating control back to the lowest setting.

NOTE: DO NOT OPERATE HEATER UNTIL THE FOLLOWING SAFETY CHECKS HAVE BEEN PERFORMED.

3.3 Safety Shutoff Component Checkout

1. Once the pilot(s) is lit and has been established for five minutes, the flame failure response time should be checked as follows:

Systems 4 and 9 - (intermittent ignition). With this system pilots are automatically lit when the operating controls call for heat. If the pilot flame fails for any reason, the main valve is shut off within one second and the pilot spark ignition is initiated until the pilot flame has been reestablished. This sequence should be checked by turning off the manual pilot gas valve (see Figure 14), and, at the same time, monitoring the audible sparking at the pilot burner and signal interruption to the main valve.

> ⚠ **Caution**
> Propane gas is heavier than air and sinks to the ground. Exercise extreme care in lighting the heater when so equipped.

System 16 - (electronically supervised standing pilot system). Extinguish the pilot flame by placing the manual pilot valve in the closed positions (see Figure 14), and at the same time, begin recording the time it takes for the output signal from the electronic ignition control to be interrupted. The signal interruption can be detected either with a test light or a voltmeter. The response time should never exceed one second.

2. Hi-Limit Checkout. For spas see Section 3.9. The manual reset high limit is factory preset to 150°F (66°C). Confirm this set point on the unit and adjust if necessary. After running the heater in a firing mode for 10 minutes, slowly close the outlet valve “A” to raise the outlet temperature as indicated on the outlet thermometer. The high limit should trip within 2°F (1°C) or 3°F (2°C) of the 150°F (66°C) setpoint and shut off the burners. If this does not occur, adjust the set point on the unit to shut off the burners when the outlet thermometer reads 150°F (66°C). Open the outlet valve “A” and push the reset button. The main burners should reignite.
3. Flow Switch: See attached vendor literature.
4. Low Water Cutoff (optional): See attached vendor literature.

3.4 Inlet Temperature and Temperature Rise Adjustment

For proper operation the bypass and outlet valves must be adjusted to obtain the correct heater temperature rise. Use the following method to set the bypass assembly at start up:

1. With all bypass valves open, fire the heater for at least 10 minutes. The operating control should be set at least 5° to 10° F above the pool temperature to ensure continued operation throughout this set up procedure.
2. Observe the thermometer on the inlet header. To prevent condensation and damage to the boiler, the inlet water temperature has to be 100°F.

If the inlet temperature is LESS THAN 100°F: With the bypass valve "A" fully open, throttle (turn down) outlet valve "B" slightly. Observe the inlet thermometer for 5 minutes to see where the inlet temperature stabilizes. If it remains under 100°F, throttle outlet valve "B" a little more. Repeat as necessary. If the inlet temperature rises above 100°F, open outlet valve "B" slightly until the inlet temperature stabilizes as close to 100°F as possible (plus or minus 2°F).

If the inlet temperature is MORE THAN 100°F. If outlet valve "B" has been throttled partially closed, open it slightly, wait 5 minutes, and, if the temperature is not down to 100°F (plus or minus 2°F) open it some more. If bypass valve "B" is fully open and you are still seeing inlet water temperatures in excess of 100°F, you can adjust bypass valve "A". Throttle it (turn down) slightly towards closed, and wait until the inlet water temperature stabilizes again. Repeat as necessary.

When the inlet temperature is stabilized at 100°F, either lock the valve handles, remove them, or prominently mark them to prevent tampering or accidental changes to the valve positions.

If the pool water temperature needs to be raised more than 10° F to reach a comfortable swimming temperature, inspect and re-adjust the valves twice a day to maintain the 100°F inlet water temperature.

3. To prevent nuisance high limit tripping, set the adjustable pump time delay relay to 10 minutes for all models. This allows the boiler pump to circulate water through the heat exchanger after the burners shut off, recovering all residual heat in the metal components.
4. The boiler outlet temperature with the bypass adjusted as detailed above should be less than 142°F. The normal range will be 10 to 37°F higher than the inlet temperature. If it exceeds 142°F, please contact the Service Department at 800-900-9276, extension 5406 for instructions. Outlet temperatures in excess of 142°F may cause intermittent high limit tripping.

POOL OPERATING CONTROL ADJUSTMENT:

5. Adjustable Differential Feature: Remove the cover from the control box and verify that the white differential potentiometer is set at about 2°F (1°C). NOTE: a 2°F differential means that, if the thermostat is set at 80°F, the heater will come on at 78°F and go off when the pool reaches 80°F. The 2°F value is a good starting point for most installations. This differential may be adjusted up or down to suit individual applications.
6. The operating control temperature setting can be adjusted incrementally to obtain the desired pool operating temperature.

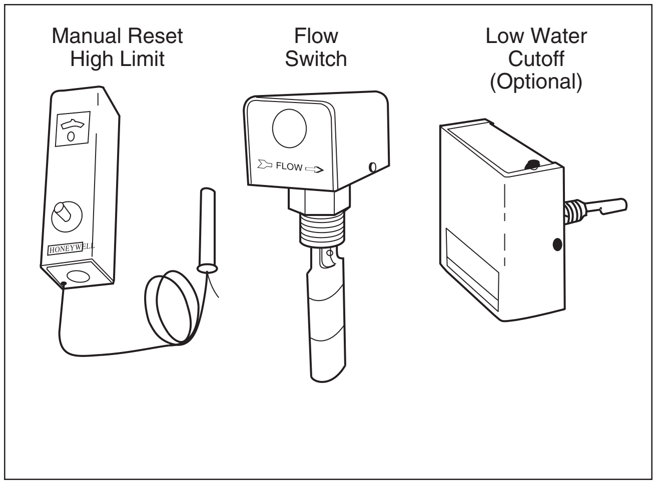


Figure 14. Safety Components.

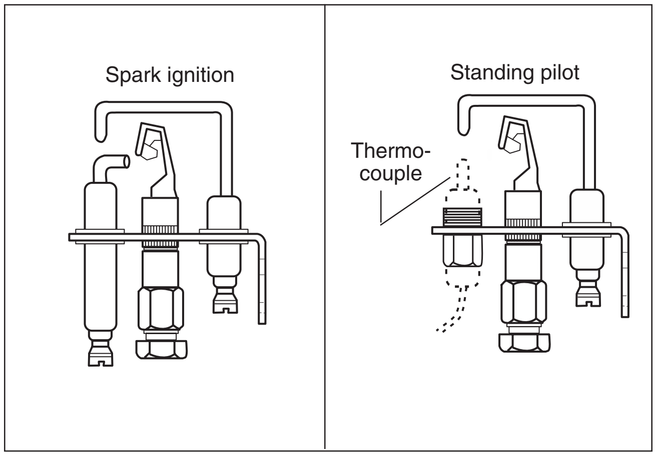


Figure 15. Pilot Burners.

3.5 Heater Shut Down

1. If heater is firing, turn operating control to lowest value, wait 10 minutes for pump to stop running, then turn power switch to off.
2. If heater is not firing, turn power switch to off.

3.6 Spring and Fall Operation Stand-by Service

Turn the thermostat down to approximately 70°F (21°C). This will prevent the pool and surrounding ground from becoming chilled and also permit the pool to be raised to swimming temperature in a shorter time.

A pool may be maintained at a lower temperature than 70°F (21°C) with some increased likelihood of condensation and damage to the unit. Models 500 through 1010 will maintain an inlet temperature of 85°F (29°C) to 90°F (32°C) (if the bypass is properly adjusted) with a pool temperature of 60°F (16°C). Models 1200 and 1430 can maintain the above with a pool temperature of 65°F (18°C). For models 1670

and 1825 pool temperature should be maintained at 70°F (21°C) or above. See item 3 in the next section.

7. An adjustable pump time delay relay is mounted in the control panel (see Figure 11). This relay keeps the pump running after the burners shut off. The delay should be set to 5-6 minutes for models 500-850 and 9-10 minutes for models 1010-1825.

3.7 Winter Operation Complete Shutdown

1. To shut down the heater for periods of several months or more, turn manual main gas valve and pilot gas valve to "OFF." Where danger of freezing does not exist, some water should flow through the heater during the normal filter cycle all year long, even when the heater is turned off or shut down completely, if all bypass valves are opened.
2. If the heater is not protected from freezing temperatures, it should be **completely drained before the first frost.** Drain the heater by removing the drain plug on the bottom of the front header casting. Leave the plug out until ready to use the heater again. Heater must be level to permit adequate draining. When compressed air is used to blow out lines, it is still necessary to follow the above procedure. Keeping the pool heated and the filter pump running continuously will not be adequate protection. If there is a pump failure or an electrical power failure, the boiler cannot fire and may freeze and be damaged.
3. **Improper Use of Heater:** The heating boiler is not designed for continuous use as an "anti-freezing" device for pools. Operating the heater with low water temperatures will cause the fins on the heat exchanger to be partially blocked with condensation. Incomplete combustion and prolonged operation under these conditions will result in the heat exchanger sooting up. This can seriously damage the heater and may create a dangerous fire hazard.

3.8 Time Clock Operation

During the warm-up period, the heater must run continuously so it can raise the pool temperature from cold to above 70°F (21°C).

Remove all time clock stops and permit the heater to raise pool temperature to 70°F (21°C) or above in one continuous operation.

When the time clock stops are replaced, be sure to allow the filter pump and the heater to stay on long enough to keep the pool up to the desired temperature.

3.9 Therapeutic Pools (Spas)

Therapeutic pools or "spa" pools are usually piped and controlled so that very warm or hot water, often with air injection, is forced at high velocity into a confined area of a swimming pool or into a small separate pool. For the purposes of this manual, any application in which the water temperature is maintained above 85°F (30°C) is considered a *spa*. **SPECIAL SET-UP AND OPERATING PROCEDURES APPLY TO SPAS**.

1. Models 1010I and 1010E and larger should **not** be used for spas due to their higher temperature rises.
2. Since outlet temperatures can approach 140°F (60°C) units **must** be piped in a primary-secondary style, similar to that shown in Figure 10.
3. To insure that the spa inlet water does not exceed 104°F (40°C), the spa filter pump must circulate at the minimum flow rates shown in Table 5.

Boiler Model	Minimum Filter Pump Flow Rate
500	220 GPM
600	270 GPM
715	320 GPM
850	380 GPM

Table 5. Minimum Filter Pump Flow Rates For Spas. Note: Maximum Spa Temperature Is Assumed To Be 100°F (38°C).

4. The high limit stop should be changed to 140°F (60°C). The set point should then be checked following the procedure in 3.3.
5. Use the outlet valve "A" to set the inlet temperature per section 3.4.
6. Spas are excellent for relaxation, body-conditioning and for arthritic and rheumatic problems, but can be hazardous. The Consumer Product Safety Commission has recommended the following "Safety Rules for Hot Tubs:"
    a. Spa or hot tub water temperature should never exceed 104°F (40°C). A temperature of 100°F (38°C) is considered safe for a healthy adult. Special caution is suggested for young children.
    b. Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness which could lead to unconsciousness and subsequently result in drowning.
    c. Pregnant women beware! Soaking in water above 102°F (39°C) can cause fetal damage during the first three months of pregnancy (resulting in the birth of a brain-damaged or deformed child). Pregnant women should stick to the 100°F (38°C) maximum rule.
    d. Before entering the spa or hot tub, users

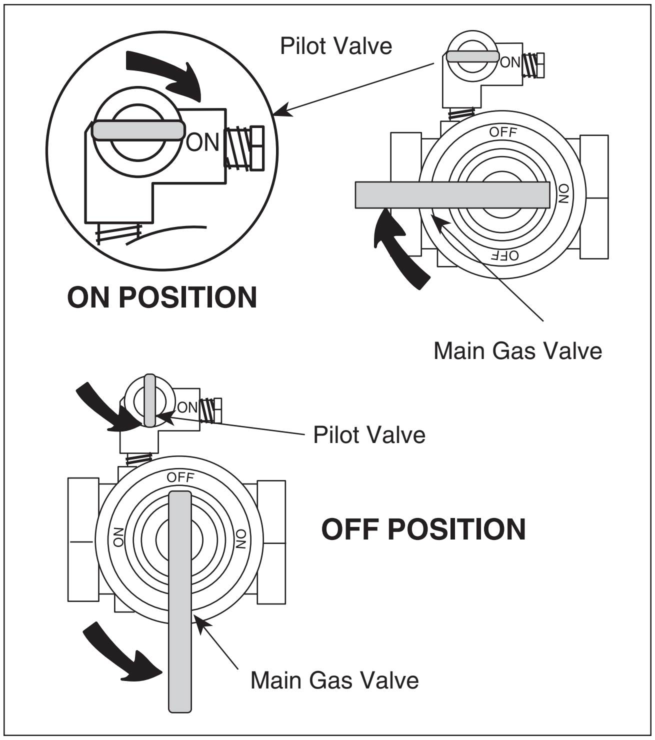


Figure 14. Manual Gas Valves.

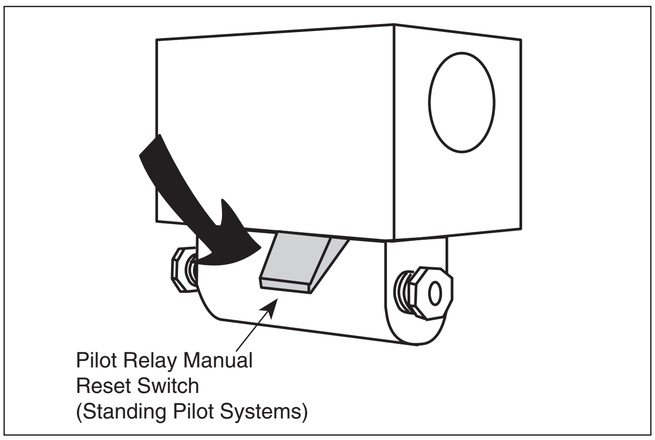


Figure 15. Pilot Safety Relay.

should check the water temperature with an accurate thermometer; spa or hot tub thermostats may err in regulating water temperatures by as much as four degrees Fahrenheit (2.2°C).

e. Persons with a medical history of heart disease, circulatory problems, diabetes or blood pressure problems should obtain their physician's advice before using spas or hot tubs.

f. Persons taking medications which induce drowsiness, such as tranquilizers, antihistamines or anticoagulants, should not use spas or hot tubs.

SECTION 4. Maintenance

1. Lubricate the pump seal every 6 months with ½ oz. of SAE 30 non-detergent oil. Slowly add to pump oil cup located on top of the bearing bracket.
2. At start-up and every six (6) months thereafter, the pilot and main burner flame should be observed for proper performance (see Figure 16). See attached lighting and shut-down instructions for proper pilot flame pattern. If flame has the appearance of "sooting" tips, check for debris near orifices and call the Pentair Water commercial Pool and Spa technical support (see page 2).
3. Inspect the venting system for obstruction, leakage and corrosion at least once each year.
4. Keep heater area clear and free from combustible material, gasoline and other flammable vapors and liquids (see Table 1 for minimum clearances).
5. Be certain all combustion air and ventilation openings in the room are unobstructed.
6. Check for fouling on the external surfaces of the heat exchanger every six months. (**NOTE:** after installation and first start-up, check the heat exchanger for fouling after the following periods of operation: 24 hours, 7 days, 30 days, 90 days and once every six months thereafter.)

   Fouling on the external surfaces of the heat exchanger is caused by incomplete combustion and is a sign of combustion air and/or venting problems. As soon as any fouling is observed, the cause of the fouling should be corrected (see Section 5, Troubleshooting Guide). The heat exchanger can be checked with a flashlight by locating a mirror under the burners. An alternate method is to remove the venting and top panels as necessary to inspect the heat exchanger from above. Also check the vent system for defects at this time. (If cleaning is required, shut off all electrical and gas supply to the heater.)
7. To expose the heat exchanger:

   Indoor Models: Remove the flue pipe, top of unit, rear upper jacket, flue collector rear panel and heat exchanger baffles.

   Outdoor Models: Remove vent top assembly, rear upper jacket, flue collector rear panel and heat exchanger baffles.
8. To remove all burners:

   It is usually more convenient to remove the burner tray assembly. Disconnect sensor wire, ignition cable (or thermocouple generator) and pilot gas line. Disconnect manifold inlet union(s). Remove the four (4) retaining screws. Grasp the manifold pipe and slide out the burner tray.

⚠ Caution

Black carbon or green soot on a dirty heat exchanger can, under certain conditions, be ignited by a random spark or open flame. To prevent this unlikely occurrence, dampen the soot deposits with wet brush or fine water spray before servicing or cleaning the heat exchanger.

9. Clean heat exchanger using a wire brush to remove soot and loose scale from the unit. Clean fallen debris from bottom of heater. Make sure burner ports are clear and pilot assembly is free of debris.
10. Reassemble in reverse order and be sure the heat exchanger baffles are replaced.
11. The gas and electric controls installed on the heater are engineered for both dependable operation and long life, but the proper functioning of these components is necessary for safe operation of the heater. It is strongly recommended that the basic items be checked by a competent serviceman every year and replaced when necessary. The basic controls are:
    a. Water temperature controls.
    b. Pilot safety system.
    c. Automatic electric gas valve(s)
    d. Flow switch.
12. Low water cutoffs should be inspected every six (6) months, when provided.

    NOTE: The warranty does not cover any damage caused by lack of required maintenance or improper operating practices.
13. Pool Water Chemistry

    The mineral content of the pool water increases every day. This is due to the natural evaporation which removes only distilled water and leaves the minerals behind. The regular addition of algicidal and sanitizing chemicals also adds greatly to the mineral content of the pool. If the concentration of minerals in the pool is permitted to become too high, the minerals will precipitate out of the water and deposit onto the walls of the pool, in the filter and in the tubes of the heat exchanger.

    For this reason it is very advantageous to drain the pool regularly (at least every two years). This precautionary measure will save the cost of expensive repairs to the finish, filter system and heater.

    Another important safety precaution - always keep the pH of the pool water between 7.3 and 7.7. This will add years to the life of the pool finish, filter system and heater.

    Most algicidal and sanitizing chemicals contain sodium hypochlorite, while others contain calcium hypochlorite. Sodium is not a scaling chemical but calcium is. When using calcium hypochlorite it is especially important to frequently check the pH of the pool and to change the pool water when the dissolved solids indicate an excessive mineral content.

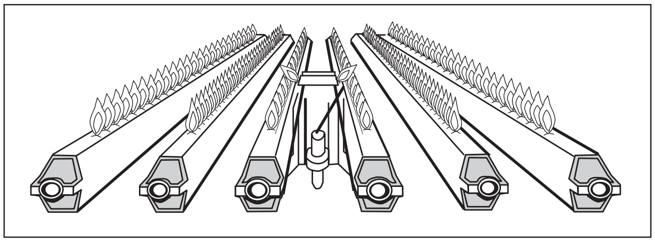


Figure 16. Main Burner Flame Pattern.

SECTION 5. Troubleshooting

For proper service and problem diagnosis of the heater and heater system, the following tools are required:

a. Gas pressure test kit with range from zero to 14 W.C. Either a slack tube manometer or an accurate gas pressure gauge is acceptable with proper adapters to connect to the available fittings in the line and on the gas valve.

b. Multi-meter with the following ranges:

   0 to 500 volts A.C.

   0 to 1000 ohms continuity.

   0 to 50 millivolts.

c. Tube cleaning kit consisting of reamer, stainless steel brush, speed handle and handle extensions.

d. A pool thermometer with a proper range.

e. A pressure gauge with proper range.

SECTION 6. PARTS

1. Symptom: heater is pounding, knocking or emitting steam from relief valve

Possible Cause	What to Do
A. Low or no water flow (most likely).	A. Is the heater wired into the filter pump circuit so that the heater cannot fire unless the pump is running? Check to see that all valves in system are open to be sure that water can circulate through the heater. Check pool filter, clean if clogged. Examine heater pump for clogged or frozen impeller. Check flow switch for proper operation and range setting.
B. Debris from system piping is blocking tubes.	B. Remove header covers. Examine all tubes and waterways. Clean out tubes. Use new gaskets when reassembling.
C. Scale has formed in tubes from high mineral content.	C. Clean tubes with tube cleaning kit. Determine hardness. Check water flow, and clean pool filter.

2. Symptom: heater will not fire

A. Heater not getting power.	A. Check to see that power switch is "ON." Use testing device to trace power to heater power source. Check fuse and secondary voltage in heater control.
B. Operating or safety control has opened circuit to electric gas valve.	B. Turn off power. Check continuity across terminals of each operating and safety control switch up to the electric gas valve. Replace defective control.
C. Pilot flame is out.	C. Relight pilot per instruction.
D. Manual reset device has tripped.	D. Reset pilot safety and all manual reset safety switches. Follow instructions for start-up.
E. No gas pressure to burners.	E. Trace gas line to service shutoff cock. If service cock is open, trace gas line to meter. If no pressure is present at meter, call for public utility service. If gas is present in heater inlet, check pressures in following sequence: (1) downstream from pressure regulator; (2) downstream from electric gas valve. Replace or adjust as necessary.
F. Electric gas valve operator is burned out or shorted.	F. Disconnect wiring harness at gas valve terminals. Check continuity of actuator coil. If open circuit or short is indicated, replace coil or operator.
G. Pump does not run.	G. Operate in manual. Check power to pump from relay, Check that pump/motor is free to rotate. Replace relay or motor as necessary.
H. Pump runs, but flow switch not closing.	H. Check continuity across flow switch. Inspect paddle for proper movement. Adjust flow range setting.
I. Field interlock open.	I. Jumper terminals and isolate problem in other equipment.

3. Symptom: pressure relief valve leaking intermittently or steadily

A. Faulty relief valve.	A. Replace with a new relief valve with proper setting (see rating plate).

4. Symptom: soot in flueways or in tubes, or noxious fumes from bad combustion

A. Combustion air supply to heater room is inadequate.	A. Check air supply opening. Look for debris in screen or louvre which covers combustion air opening, or for objects blocking the opening.
B. Stack or vent is blocked or restrictive.	B. Look for blocked stack and excessive number of elbows in stack or excessive length of horizontal runs.
C. Severe downdraft is causing spillage of flue products into room.	C. Check for (1) proper vent cap on stack; (2) adequate height of stack above roof; (3) equipment exhausting air from inside of building; and (4) proper installation of draft diverter.
D. Gas pressure to burners is excessive.	D. Check gas pressure with manometer, and adjust with heater firing at full rate.
E. Heater not fitted for the fuel supplied.	E. See nameplate for correct fuel.
F. Heater installed at high altitude without proper derating.	F. Installations at altitudes in excess of 2000 ft. above sea level are subject to jurisdiction of the local inspection authorities. Check orifice size, contact your dealer or factory for proper size.

5. Symptom: water dripping in firebox

A. Tube in heat exchanger has overheated and ruptured.	A. Tube failure is almost always caused by scale formation in the tube, or inadequate water flow through the heater.
B. Heater is condensing from low inlet temperature.	B. Check bypass valve adjustment.

SECTION 6. Parts Description and Order Numbers

Key No	Description	Size 500	Size 600	Size 715	Size 850	Size 1010	Size 1200	Size 1430	Size 1670	Size 1825
Jacket and Combustion Chamber Components										
1	Top Panel Assembly	10535701	10535702	10535703	10535704	10535705	10535706	10535707	10535708	10535709
2	Spacer, Flue Collector	-	-	-	10540800	10540800	10540800	10540800	10540800	10540800
3	End Panel, Flue Collector, Left	10533700	10533700	10533700	10533700	10533700	10533700	10533700	10533700	10533700
4	End Panel, Flue Collector, Right	10533800	10533800	10533800	10533800	10533800	10533800	10533800	10533800	10533800
5	Rear Panel, Flue Collector {Indoor}	10535501	10535502	10535503	10535504	10535505	10535506	10535507	10535508	10535509
6	Front Support, Flue Collector {Indoor}	10534401	10534402	10534403	10534404	10534405	10534406	10534407	10662108	10662109
7	Tile Cover, Front/Rear {Indoor}	10534201 (2)	10534202 (2)	10534203 (2)	10534204 (4)	10534205 (4)	10534206 (4)	10534207 (4)	10661508 (4)	10661509 (4)
8	Tile Heat Shield/Spacer, Front and Rear	10560100 (2)	-	-	-	-	-	-	-	-
9	Tile Heat Shield/Spacer, Front	-	10547901	10547902	-	-	10547903	10547901	10547904	10547903
10	Tile Heat Shield/Spacer, Front	-	-	-	10548002	10548003	-	-	-	10548001
11	Tile Heat Shield/Spacer, Front	-	-	-	-	-	10548101	10548102	10548103	10548104
12	Tile Heat Shield/Spacer, Rear	-	10548201	10548202	-	-	10548203	10548201	10548204	10548203
13	Tile Heat Shield/Spacer, Rear	-	-	-	10548302	10548303	-	-	-	10548301
14	Tile Heat Shield/Spacer, Rear	-	-	-	-	-	10548401	10548402	10548403	10548404
15	Saddle Assembly, End Tile	10533600 (2)	10533600 (2)	10533600 (2)	10533600 (2)	10533600 (2)	10533600 (2)	10533600 (2)	10533600 (2)	10533600 (2)
16	Lower End Panel/ Heat Shield Weldment, Right	10540701	10540701	10540701	10540701	10540701	10540701	10540701	10540701	10540701
17	Lower End Panel/ Heat Shield Weldment, Left	10540702	10540702	10540702	10540702	10540702	10540702	10540702	10540702	10540702
18	Lower Rear Panel Weldment	10532901	10532902	10532903	10532904	10532905	10532906	10532907	10532908	10532909
19	Middle Rear Panel/ Heat Shield Weldment	10540401	10540402	10540403	10540404	10540405	10540406	10540407	10540408	10540409
20	End Panel, Upper Right	10531600	10531600	10531600	10531600	10531600	10531600	10531600	10531600	10531600
21	End Panel, Upper Left	10534000	10534000	10534000	10534000	10534000	10534000	10534000	10534000	10534000
22	Upper Rear Panel/ Heat Shield Weldment	10540501	10540502	10540503	10540504	10540505	10540506	10540507	10540508	10540509
23	Front Panel, Upper	10531501	10531502	10531503	10531504	10531505	10531506	10531507	10531508	10531509
24	Bracket, Support, End Tile	10551000 (2)	10551000 (2)	10551000 (2)	10551000 (2)	10551000 (2)	10551000 (2)	10551000 (2)	10551000 (2)	10551000 (2)
25	Drafthood, Relief Baffle, Right	10540901	10540902	10540903	10540904	10540905	10540906	10540907	10540908	10540909
26	Drafthood, Relief Baffle, Left	10541001	10541002	10541003	10541004	10541005	10541006	10541007	10541008	10541009
27	Lower Front Panel/ Heat Shield Weldment	10554601	10554602	10554603	10554604	10554605	10554606	10554607	10554608	10554609

NOTE: Numbers in ( ) represent quantity required for each size. Quantity is one otherwise.

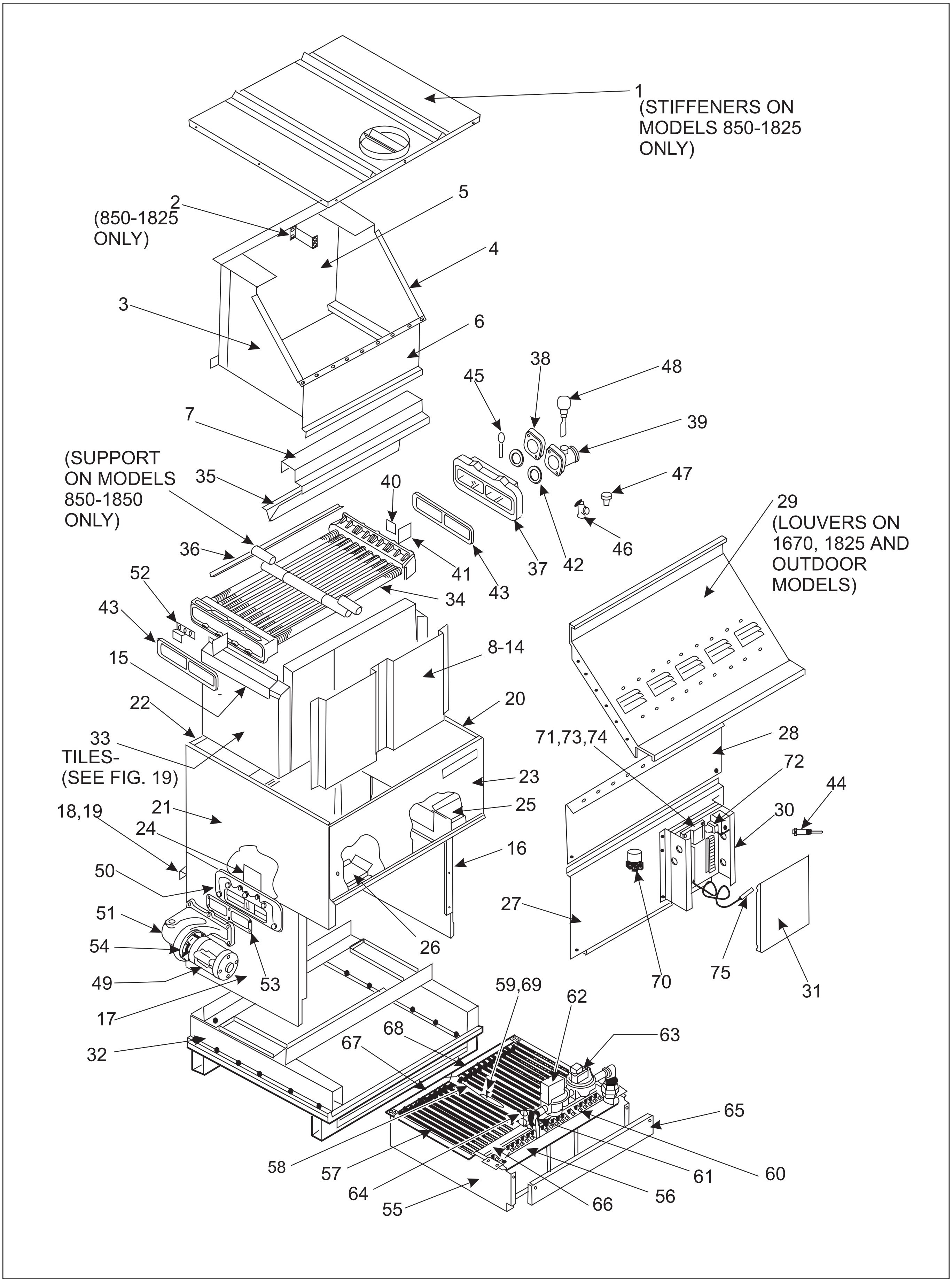


Figure 17. Parts Identification.

Key No	Description	Size 500	Size 600	Size 715	Size 850	Size 1010	Size 1200	Size 1430	Size 1670	Size 1825
28	Middle Front Panel {Indoor}	10554401	10554402	10554403	10554404	10554405	10554406	10554407	10662008	10662009
29	Sweep Sheet, Flue Collector {Indoor}	10533901	10533902	10533903	10533904	10533905	10533906	10533907	10662208	10662209
30	Control Box Weldment	10545800	10545800	10545800	10545800	10545800	10545800	10545800	10545800	10545800
31	Control Box Cover {Indoor}	10547200	10547200	10547200	10547200	10547200	10547200	10547200	10547200	10547200
32	Base/Tile Support Assembly {Indoor}	10536901	10536902	10536903	10536904	10536905	10536906	10536907	10536908	10536909
33	Tile Assemblies **{Refer to Figure 20 for configurations and Part Numbers}**									
Optional Items										
	Non-Combustible Base {Rail}	10539000 (2)	10539000 (2)	10539000 (2)	10539000 (2)	10539000 (2)	10539000 (2)	10539000 (2)	10539000 (2)	10539000 (2)
Water System										
34	8-Tube Assembly, Copper Tubes/ Cast Iron Tubs {Indoor}	10534701	10534702	10534703	10534704	10534705	10534706	10534707	-	-
	8-Tube Assembly, Copper Tubes/ Bronze Tubs {Indoor}	10542901	10542902	10542903	10542904	10542905	10542906	10542907	-	-
	8-Tube Assembly, CU-NI Tubes/ Cast Iron Tubs {Indoor}	10553601	10553602	10553603	10553604	10553605	10553606	10553607	-	-
	8-Tube Assembly, CU-NI Tubes/ Bronze Tubs {Indoor}	10553701	10553702	10553703	10553704	10553705	10553706	10553707	-	-
	10-Tube Assembly, Copper Tube/ Cast Iron Tubs {Indoor}	-	-	-	-	-	-	-	10665908	10665909
	10-Tube Assembly, Copper Tube/ Bronze Tubs {Indoor}	-	-	-	-	-	-	-	20001108	20001109
	10-Tube Assembly, CU-NI Tubes/ Cast Iron Tubs {Indoor}	-	-	-	-	-	-	-	20001008	20001009
	10-Tube Assembly, CU-NI Tubes/ Bronze Tubs {Indoor}	-	-	-	-	-	-	-	10670408	10670409
35	Baffle, Heat Exchanger Front/ Rear {Indoor}	10534301 (2)	10534302 (2)	10534303 (2)	10534304 (4)	10534305 (4)	10534306 (4)	10534307 (4)	20020108 (4)	20020109 (4)
36	Baffle, Heat Exchanger {8-Tube}	10534601 (7)	10534602 (14)	10534603 (14)	10534604 (14)	10534605 (14)	10534606 (28)	10534607 (28)	- -	- -
	Baffle, Heat Exchanger {10-Tube}	-	-	-	-	-	-	-	10667708 (28)	10667709 (14)
	Baffle, Heat Exchanger {10-Tube}	-	-	-	-	-	-	-	-	10667702 (14)

NOTE: Numbers in ( ) represent quantity required for each size. Quantity is one otherwise.

Key No	Description	Size 500	Size 600	Size 715	Size 850	Size 1010	Size 1200	Size 1430	Size 1670	Size 1825
37	Inlet/Outlet Header, Machined [S0094300 Glassed Cast Iron]	10364500	10364500	10364500	10364500	10364500	10364500	10364500	10364500	10364500
	Inlet/Outlet Header, Machined [S0064000 Bronze]	10364501	10364501	10364501	10364501	10364501	10364501	10364501	10364501	10364501
38	Flange, 2-1/2" NPT Machined [S0063600 Cast Iron]	10391303	10391303	10391303	10391303	10391303	10391303	10391303	10391303	10391303
	Flange, 2-1/2" NPT Machined [S0064400 Bronze]	10391304	10391304	10391304	10391304	10391304	10391304	10391304	10391304	10391304
39	Tee, Machined Flange [Glassed Cast Iron]	20130002	20130002	20130002	20130002	20130002	20130002	20130002	20130002	20130002
	Tee, Machined Flange [Bronze]	20150303	20150303	20150303	20150303	20150303	20150303	20150303	20150303	20150303
40	Baffle, Water Inlet	10338300	10338300	10338300	10338300	10338300	10338300	10338300	10338300	10338300
41	Barrier, Water	20230101 (2)	20230101 (2)	20230101 (2)	20230101 (2)	20230101 (2)	20230101 (2)	20230101 (2)	20230101 (2)	20230101 (2)
42	Flange Gasket	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)
43	Header Gasket w/Barrier	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)
44	Well, Immersion	E2074000	E2074000	E2074000	E2074000	E2074000	E2074000	E2074000	E2074000	E274000
45	Well, High Limit	E0025900	E0025900	E0025900	E0025900	E0025900	E0025900	E0025900	E0025900	E0025900
46	Valve, Pressure Relief 3/4 NPT 75 PSI	A0063300	A0063300	A0063300	A0063600	A0063600	A0063600	A0063600	A0063600	A0063600
47	Temperature Gauge	A2089500 (2)	A2089500 (2)	A2089500 (2)	A2089500 (2)	A2089500 (2)	A2089500 (2)	A2089500 (2)	A2089500 (2)	A2089500 (2)
48	Flow Switch {Indoor}	E0013100	E0013100	E0013100	E0013100	E0013100	E0013100	E0013100	E0013100	E0013100
	Flow Switch {Outdoor}	E0013000	E0013000	E0013000	E0013000	E0013000	E0013000	E0013000	E0013000	E0013000
49	Pump, Motor, Impeller	A2001800	A2001800	A2001800	A2001800	A2001800	A2001800	A2001800	A2001800	A2001900
50	Pump Adapter {Glassed Cast Iron}	10364200	10364200	10364200	10364200	10364200	10364200	10364200	10364200	10364200
	Pump Adapter {Cast Bronze}	10364201	10364201	10364201	10364201	10364201	10364201	10364201	10364201	10364201
51	Pump Housing {Glassed Cast Iron}	10261501	10261501	10261501	10261501	10261501	10261501	10261501	10261501	10261501
	Pump Housing {Bronze}	10483301	10483301	10483301	10483301	10483301	10483301	10483301	10483301	10483301
52	Baffle, Diffuser	10338400	10338400	10338400	10338400	10338400	10338400	10338400	10338400	10338400
53	Pump Housing Gasket	S0024600	S0024600	S0024600	S0024600	S0024600	S0024600	S0024600	S0024600	S0024600
54	Pump Motor Gasket,	A0021400	A0021400	A0021400	A0021400	A0021400	A0021400	A0021400	A0021400	A0021400

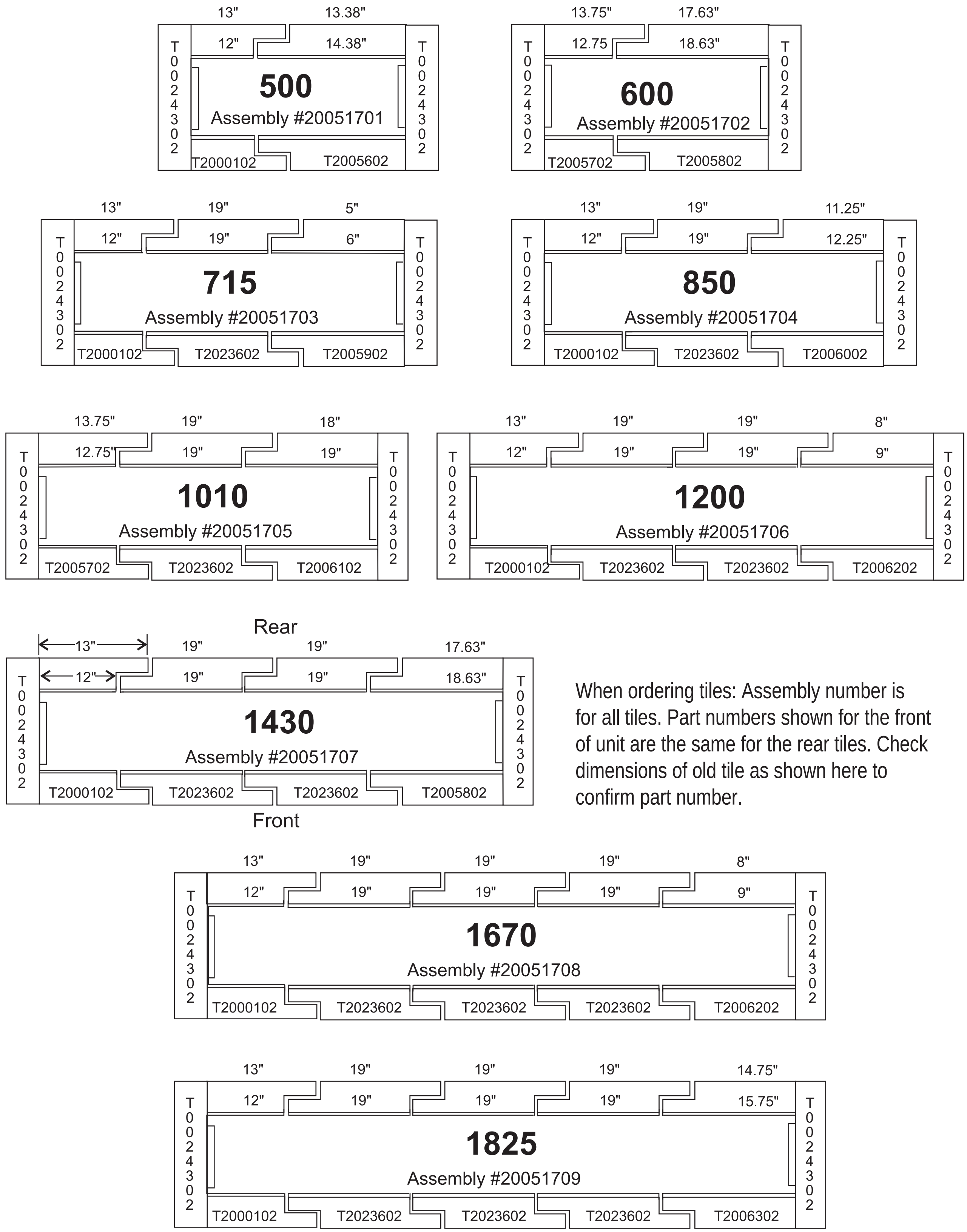
NOTE: Numbers in ( ) represent quantity required for each size. Quantity is one otherwise.

Key No	Description	Size 500	Size 600	Size 715	Size 850	Size 1010	Size 1200	Size 1430	Size 1670	Size 1825
	Gas System									
55	Burner Tray, IID, On/Off, Single Sect. Manifold {Nat.}	10550601	10550602	10550603	10550604	10550605	10550606	10550607	10550608	10550609
	Burner Tray, IID, On/Off, Single Sect. Manifold {LP}	20097401	20097402	20097403	20097404	20097405	20097406	20097407	20097408	20097409
	Burner Tray, St. Pilot, On/Off, Single Sect. Manifold {Nat.}	10526201	10526202	10526203	10526204	10526205	10526206	10526207	10526208	10526209
	Burner Tray, St. Pilot, On/Off, Single Sect. Manifold {LP}	10529601	10529602	10529603	10529604	10529605	10529606	10529607	10529608	10529609
56	Gas Manifold Weldment {Single Inlet}	10525901	10525902	10525903	10525904	10525905	10525906	10525907	10525908	10525909
57	Burner, Main	L0052300	L0052300	L0052300	L0052300	L0052300	L0052300	L0052300	L0052300	L0052300
58	Pilot Bracket/Burner Weldment {Honeywell}	10529502	10529502	10529502	10529502	10529502	10529502	10529502	10529502	10529502
59	Pilot Burner {Honeywell} Standing Pilot {Nat.}	W0035800	W0035800	W0035800	W0035800	W0035800	W0035800	W0035800	W0035800	W0035800
	Pilot Burner {Honeywell} Standing Pilot {LP}	W0034400	W0034400	W0034400	W0034400	W0034400	W0034400	W0034400	W0034400	W0034400
	Pilot Burner {Honeywell} IID Pilot {Nat.}	W0034300	W0034300	W0034300	W0034300	W0034300	W0034300	W0034300	W0034300	W0034300
	Pilot Burner {Honeywell} IID Pilot {LP}	W2001500	W2001500	W2001500	W2001500	W2001500	W2001500	W2001500	W2001500	W2001500
60	Orifice, Nat. Gas - 4" W.C. {Sea Level}	L0050700 (22)	L0050700 (26)	L0050700 (30)	L0050700 (36)	L0050700 (42)	L0050700 (50)	L0050700 (60)	L0050700 (70)	L0050700 (76)
	Orifice, Propane - 9" W.C. {Sea Level}	L0032900 (22)	L0032900 (26)	L0032900 (30)	L0032900 (36)	L0032900 (42)	L0032900 (50)	L0032900 (60)	L0032900 (70)	L0032900 (76)
61	Valve, Manual, Gas {Nat.}	V0004200	V0004200	V0004200	V0004300	V0004300	V0004300	V0004300	V0004300	V0004300
	Valve, Manual, Gas {LP}	V0004800	V0004800	V0004800	V0004800	V0004200	V0004200	V0004300	V0004300	V0004300
62	Safety Gas Valve, On-Off {Nat.}	V0046600	V0046600	V0046600	V0046600	V0046700	V0046700	V0046700	V0046700	V0046800
	Safety Gas Valve, On-Off {LP}	V0046600	V0046600	V0046600	V0046600	V0046600	V0046600	V0046700	V0046700	V0046700
63	Valve, Gas, Operating/Reg. On-Off {Nat.}	V0051200	V0051200	V0051200	V0051200	V0051300	V0051300	V0051300	V0051400	V0051400
	Valve, Gas, Operating/Reg. On-Off {LP}	V0054800	V0054800	V0054800	V0054800	V0054800	V0054800	V0054900	V0054900	V0054900
64	Valve, Pilot, Gas Manual	W0002100	W0002100	W0002100	W0002100	W0002100	W0002100	W0002100	W0002100	W0002100

NOTE: Numbers in ( ) represent quantity required for each size. Quantity is one otherwise.

Key No	Description	Size 500	Size 600	Size 715	Size 850	Size 1010	Size 1200	Size 1430	Size 1670	Size 1825
65	Manifold Cover Plate Assembly {Single Pilot}	10552901	10552902	10552903	10552904	10552905	10552906	10552907	10552908	10552909
66	Burner Anti-Rotation Bracket {Single Pilot}	10525301	10525302	10525303	10525304	10525305	10525306	10525307	10525308	10525309
67	Burner Tie Down Bracket, Left {Single Pilot}	10525701	10525702	10525703	10525704	10525705	10525707	10525708	10525709	10525710
68	Burner Tie Down Bracket, Right {Single Pilot}	10542001	10542002	10542003	10542004	10542005	10542007	10542008	10542009	10542010
69	Thermocouple {Standing Pilot}	W0036500	W0036500	W0036500	W0036500	W0036500	W0036500	W0036500	W0036500	W0036500
70	Pilot Solenoid Valve (IID) W0019300	W0019300	W0019300	W0019300	W0019300	W0019300	W0019300	W0019300	W0019300	
	Man. Reset Pilot Relay (std.pilot)	W0030000	W0030000	W0030000	W0030000	W0030000	W0030000	W0030000	W0030000	W0030000
	Electrical Components									
71	Ignition Control, Electronic, U.S. {Nat.}	E0100900	E0100900	E0100900	E0100900	E0100900	E0100900	E0100900	E0100900	E0100900
	Ignition Control, Elec. Can./ Spark LP/CSD-1 {100% Lkout}	E2033900	E2033900	E2033900	E2033900	E2033900	E2033900	E2033900	E2033900	E2033900
72	Transformer, 115V/24V	E0086100	E0086100	E0086100	E0086100	E0086100	E0086100	E0086100	E0086100	E0086100
73	Switch, High Limit, Manual Reset	E2103900	E2103900	E2103900	E2103900	E2103900	E2103900	E2103900	E2103900	E2103900
74	Controller, Water Temp.	E2103800	E2103800	E2103800	E2103800	E2103800	E2103800	E2103800	E2103800	E2103800
75	Sensor, Water Temp.	E2103600	E2103600	E2103600	E2103600	E2103600	E2103600	E2103600	E2103600	E2103600
	Electrical Components {Optional}									
	M/R High Gas Pressure Switch	E0023300	E0023300	E0023300	E0023300	E0023300	E0023300	E0023300	E0023300	E0023300
	M/R Low Gas Pressure Switch	E0023500	E0023500	E0023500	E0023500	E0023500	E0023500	E0023500	E0023500	E0023500
	M/R Low Water CutOff	E2075100	E2075100	E2075100	E2075100	E2075100	E2075100	E2075100	E2075100	E2075100
	Vent Valve 120 Volts {System 4}	V0019000	V0019000	V0019000	V0019000	V0019000	V0019000	V0019000	V0019000	V0019000
	Vent Valve 24 Volts {System 9, 11}	V2000100	V2000100	V2000100	V2000100	V2000100	V2000100	V2000100	V2000100	V2000100
	Outdoor Jacket, Combustion Chamber, Heat Exchanger Components									
	<u>Refer To Figure 19 For Placement</u>									
5	Rear Panel, Flue Collector {Outdoor}	10661701	10661702	10661703	10661704	10661705	10661706	10661707	10661708	10661709
6	Front Support, Flue Collector {Outdoor}	10662101	10662102	10662103	10662104	10662105	10662106	10662107	10662108	10662109
7	Tile Cover, Front/Rear {Outdoor}	10661501 (2)	10661502 (2)	10661503 (2)	10661504 (4)	10661505 (4)	10661506 (4)	10661507 (4)	10661508 (4)	10661509 (4)
28	Middle Front Panel {Outdoor}	10662001	10662002	10662003	10662004	10662005	10662006	10662007	10662008	10662009
29	Sweep Sheet, Flue Collector10662201 {Outdoor}	10662202	10662203	10662204	10662205	10662206	10662207	10662208	10662209	

NOTE: Numbers in ( ) represent quantity required for each size. Quantity is one otherwise.



When ordering tiles: Assembly number is for all tiles. Part numbers shown for the front of unit are the same for the rear tiles. Check dimensions of old tile as shown here to confirm part number.

Figure 18. Tile Assemblies.

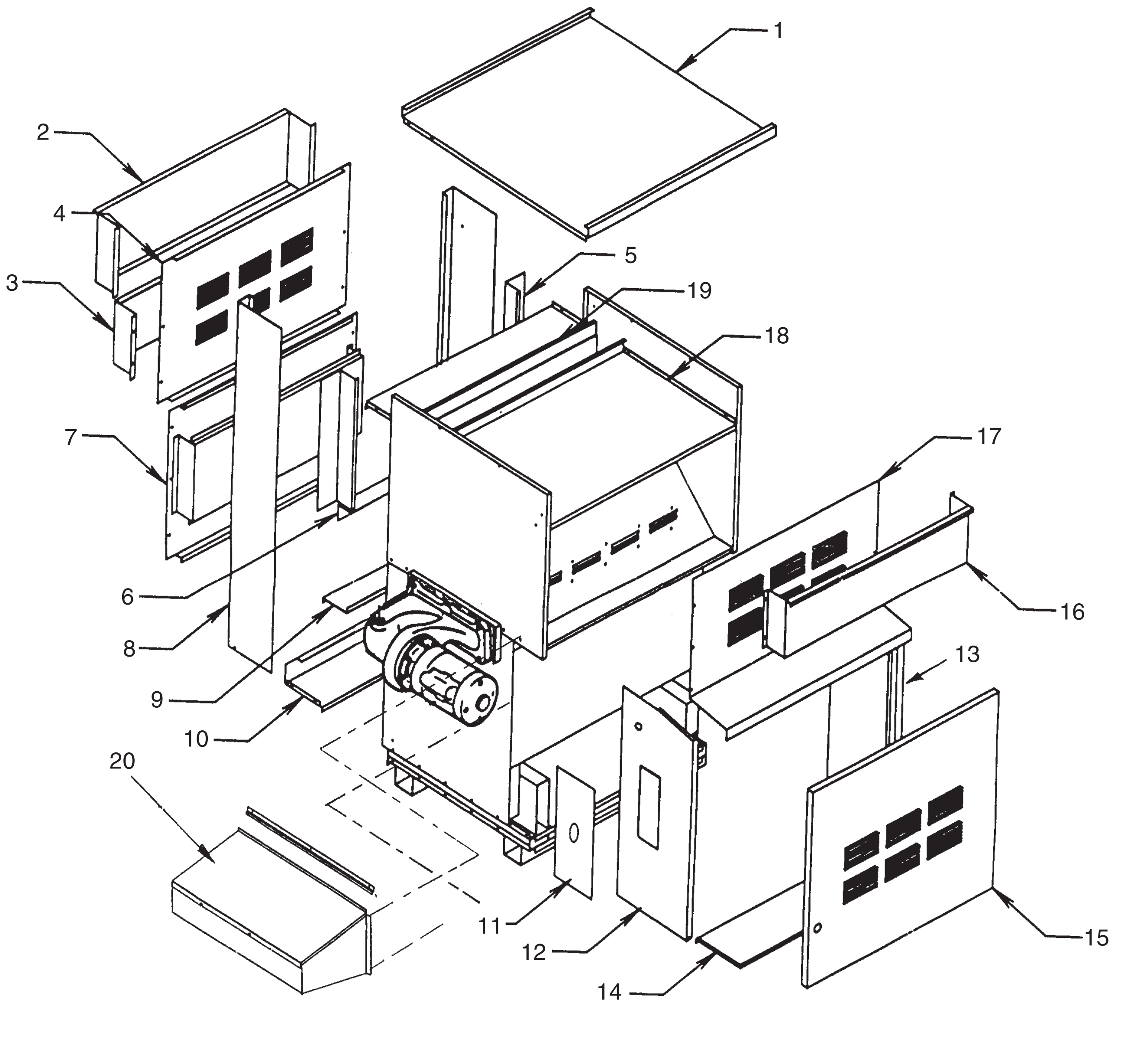


Figure 19. Outdoor Parts.

Key No	Description	Size 500	Size 600	Size 715	Size 850	Size 1010	Size 1200	Size 1430	Size 1670	Size 1825
31	Control Box Cover {Outdoor}	10630300	10630300	10630300	10630300	10630300	10630300	10630300	10630300	10630300
32	Non-Combustible Base/Tile 10602301 Support Assembly {Outdoor}	10602302	10602303	10602304	10602305	10602306	10602307	10602308	10602309	
34	10-Tube Assembly, Copper Tube/Cast Iron Tubs {Outdoor}	10665901	10665902	10665903	10665904	10665905	10665906	10665907	10665908	10665909
	10-Tube Assembly, Copper Tube/Bronze Tubs {Outdoor}	20001101	20001102	20001103	20001104	20001105	20001106	20001107	20001108	20001109
	10-Tube Assembly, CU-NI Tubes/ Cast Iron Tubs {Outdoor}	20001001	20001002	20001003	20001004	20001005	20001006	20001007	20001008	20001009
	10-Tube Assembly, CU-NI Tubes/ Bronze Tubs {Outdoor}	10670401	10670402	10670403	10670404	10670405	10670406	10670407	10670408	10670409
35	Baffle, Heat Exchanger Front/Rear {Outdoor}	20020101 (2)	20020102 (2)	20020103 (2)	20020104 (2)	20020105 (2)	20020106 (2)	20020107 (2)	20020108 (2)	20020109 (2)
36	Baffle, Heat Exchanger, 10-Tube	10667701 (7)	10667702 (14)	10667703 (14)	10667704 (14)	10667705 (14)	10667706 (28)	10667707 (28)	10667708 (28)	10667709 (14)
	Baffle, Heat Exchanger, 10-Tube	-	-	-	-	-	-	-	-	10667702 (14)
	Refer To Figure 21 For Placement									
1	Top Panel	10660701	10660702	10660703	10660704	10660705	10660706	10660707	10660708	10660709
2	Rear Windshield	10658101	10658102	10658103	10658104	10658105	10658106	10658107	10658108	10658109
3	Upper Rear Louver shield	10657101	10657102	10657103	10657104	10657105	10657106	10657107	10657108	10657109
4	Upper Rear Panel	10658701	10658702	10658703	10658704	10658705	10658706	10658707	10658708	10658709
5	Gap Closure-Side	10660200 (2)	10660200 (2)	10660200 (2)	10660200 (2)	10660200 (2)	10660200 (2)	10660200 (2)	10660200 (2)	10660200 (2)
6	Gap Closure-Middle	10660101	10660102	10660103	10660104	10660105	10660106	10660107	10660108	10660109
7	Lower Rear Panel Assembly 10660501	10660502	10660503	10660504	10660505	10660506	10660507	10660508	10660509	
8	Rear End Panel Left and Right	10657700 (2)	10657700 (2)	10657700 (2)	10657700 (2)	10657700 (2)	10657700 (2)	10657700 (2)	10657700 (2)	10657700 (2)
9	Lower Rear Shield-Inner	10659901	10659902	10659903	10659904	10659905	10659906	10659907	10659908	10659909
10	Rear Base Extension	10658501	10658502	10658503	10658504	10658505	10658506	10658507	10658508	10658509
11	Gas Train Interface Plate	20050200	20050200	20050200	20050200	20050200	20050200	20050200	20050200	20050200
12	Left Front End Panel	10657501	10657501	10657501	10657501	10657501	10657501	10657501	10657501	10657501
13	Right Front End Panel	10657502	10657502	10657502	10657502	10657502	10657502	10657502	10657502	10657502
14	Front Base Extension	10659701	10659702	10659703	10659704	10659705	10659706	10659707	10659708	10659709
15	Door Panel Weldment	20050401	20050402	20050403	20050404	20050405	20050406	20050407	20050408	20050409
	Left Door Panel Weldment	-	-	-	-	20100705	20100706	20100707	20100708	20100709

NOTE: Numbers in ( ) represent quantity required for each size. Quantity is one otherwise.

Key No	Description	Size 500	Size 600	Size 715	Size 850	Size 1010	Size 1200	Size 1430	Size 1670	Size 1825
16	Front Windshield	10659101	10659102	10659103	10659104	10659105	10659106	10659107	10659108	10659109
17	Upper Front Panel	10658901	10658902	10658903	10658904	10658905	10658906	10658907	10658908	10658909
18	Flue Panel Front	10659501	10659502	10659503	10659504	10659505	10659506	10659507	10659508	10659509
19	Flue Panel Rear	10659301	10659302	10659303	10659304	10659305	10659306	10659307	10659308	10659309
20	Pump Cover Assembly	20050100	20050100	20050100	20050100	20050100	20050100	20050100	20050100	20050100
Pump Parts										
	Pump Coupler Assembly, Armstrong 1050	A2010500	A2010500	A2010500	A2010500	A2010500	A2010500	A2010500	A2010500	A2010500
	Pump Module, Shaft and Bearing, Armstrong 1050	A2010100	A2010100	A2010100	A2010100	A2010100	A2010100	A2010100	A2010100	A2010100
	Seal Kit, Armstrong 150	A2010200	A2010200	A2010200	A2010200	A2010200	A2010200	A2010200	A2010200	A2010200
	Impeller, Armstrong 1050, 4.53" dia.	A2010304	A2010304	A2010304	A2010304	A2010304	A2010304	A2010304	A2010304	-
	Impeller, Armstrong 1050, 4.85" dia.	-	-	-	-	-	-	-	-	A2010305

Pentair Water
Commercial Pool and Spa™

1620 Hawkins Ave., Sanford, NC 27330 • (919) 566-8000
10951 West Los Angeles Ave., Moorpark, CA 93021 • (805) 553-5000

P/N 472643 Rev A - 05/22/06
Litho in U.S.A